August xx, 2000 Certified Mail # Z 029 877 xxx

Larry Kraynik
Terminal Supervisor
Mobil Oil Corporation Hammond Terminal
1527 – 141st Street
Hammond, Indiana 46320

Re: First Minor Permit Modification 089-12382 to Part 70 Permit # T089-7786-00233

Dear Mr. Kraynik:

Mobil Oil Corporation was issued a permit on December 30, 1997 for a Petroleum Bulk Terminal. An application requesting changes to this permit was received on April 24, 2000. Pursuant to the provisions of 326 IAC 2-7-12 a minor permit modification to this permit is hereby approved as described in the attached Technical Support Document.

The modification consists of the addition of an internal float pan including a mechanical shoe seal with a rim-mounted secondary seal to existing Tank #115. Tank #115 will be removed from Section D.4 in your Title V Permit and will replace Tank 159 in Section D.3 which contains the Federal requirements.

All other conditions of the permit shall remain unchanged and in effect. Please attach a copy of this modification and the following revised permit pages to the front of the original permit.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter, please contact this Department at (219) 853-6306.

Sincerely,

Ronald Novak, Director
Hammond Department of Environmental Management
Air Pollution Control Division

cc: Cheryl Newton, Chief Program Evaluation Section, U. S. E. P. A., Region V
Mindy Hahn, Permits Administration, IDEM-OAM

RH

ENCLOSURES

PART 70 OPERATING PERMIT

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
and
HAMMOND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
AIR POLLUTION CONTROL DIVISION

Mobil Oil Corporation
1527 - 141st Street
Hammond, Indiana 46320

(herein known as the Permittee) is hereby authorized to operate subject to the conditions contained herein, the source described in Section A (Source Summary) of this permit.

This permit is issued in accordance with 326 IAC 2 and 40 CFR Part 70 Appendix A and contains the conditions and provisions specified in 326 IAC 2-7 and 326 IAC 2-1-3.2 as required by 42 U.S.C. 7401, et. seq. (Clean Air Act as amended by the 1990 Clean Air Act Amendments), 40 CFR Part 70.6, IC 13-15 and IC 13-17.

Operation Permit No.: T089-7786-00233	
Original Issued By: Felicia R. George, Assistant Commissioner Office of Air Management	Issuance Date: December 30, 1997

First Administrative Permit Amendment.: AT089-9895-00233 issued August 14, 1998.
First Minor Source Modification: 089-12342-0233 issued July 12, 2000.

First Minor Permit Modification: 089-12382-00233	Pages Affected: 4, 6, 7, 35, 36, 37, and 38
Issued by: _____ Ronald L. Novak, Director Hammond Department of Environmental Management	Issuance Date:

Calculations for addition of internal float pan to fixed cone roof tank 115.

Potentials before and after the addition of an internal float pan to fixed cone tank 115.

Although an internal float roof does reduce emissions, adding the float roof with rim seals will qualify the tank to store gasoline which is more volatile and has a higher emission factor than petroleum liquids currently allowed in fixed cone roof tanks.

Therefore, the before and after potentials will be based on the difference between an internal float roof tank with gasoline and a fixed cone tank with distillate fuel oil.

Enter tank capacities and expected throughputs. Emission Factor (EF) will change with product. EF/1000 can be derived from previous emission statements or other like tanks at other sources. EF/1000 can also be determined from AP42 or TANKS Program 4.0 which is approved by EPA.

After addition of internal float pan:

Tank #	Type	Product	Capacity	Thruput	SCC #	EF/1000	T/yr
115	IF	gasoline	1,617,924		4-04-001-12	3.600	2.912
				50,000,000	4-04-001-16	0.002	0.050
					Total	2.962 TPY	

Before addition of internal float pan:

115	FC	distillate fuel oil	1,617,924		4-03-010-16	0.4400	0.3559
				25,000,000	4-03-010-18	0.0300	0.3750
					Total	0.731 TPY	

Increase in potential emissions due to the addition of an internal float pan: 2.231 TPY

This is another method of calculating the increase of potential emissions due to the conversion of a fixed cone roof tank to an internal float roof tank. These calculations were used to check the previous calculations.

RH/06/01/00

Hammond Department of Environmental Management (HDEM)
- Air Pollution Control Division -
and
Indiana Department of Environmental Management (IDEM)
Office of Air Management

Technical Support Document (TSD) for a Minor Source Modification and a Minor Permit Modification to a Part 70 Permit

Source Background and Description

Source Name:	Mobil Oil Corporation	Part 70 Permit:	T089-7786-00233
Source Location:	1527 – 141st Street, Hammond		
County:	LAKE		
Minor Source Modification:	089-12342-00233		
Minor Permit Modification:	089-12382-00233		
SIC Code:	5171 - Petroleum Bulk Station, Terminal		
Permit Reviewer:	Ronald Holder		

The Hammond Department of Environmental Management (HDEM) has reviewed an application from Mobil Oil Corporation relating to the installation of an internal floating roof including a mechanical shoe seal and rim-mounted secondary seal for Petroleum Liquid Storage Tank #115 at the above Hammond location.

The modification will qualify the tank for gasoline storage and New Source Performance Standards (NSPS) 40 CFR 60, Subpart Kb, for Volatile Organic Liquid Storage Vessels. A minor source modification will be required per 326 IAC 2-7-10.5 (d)(6). A minor permit modification will be issued per 326 IAC 2-7-12 (b)(1)(E) because the required reporting and record keeping per NSPS is not considered a modification under Title I of the CAA.

The minor permit revision will consist of replacing Tank 159 in Section D.3 of the Part 70 Permit. Section D.3 was the construction and operation conditions for Tank 159 which Mobil does not plan to build (see attached facsimile). Section D.3, which contains the federal requirements for new and modified petroleum tanks, will become the facility operation conditions section for the converted Tank 115.

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (^{0}F)
Tank #115	Gasoline storage	40	90	N/A	ambient

Recommendation

The staff recommends to the Director that the construction and operation be approved. This recommendation is based on the following facts and conditions:

Information, unless otherwise stated, used in this review is derived from the application and additional information submitted by the applicant. A complete application for the purpose of this review was received on April 24, 2000.

Emissions Calculations

See Appendix A (Emissions Calculation Spreadsheets) for detailed calculations (three (3) pages).

Total Potential and Allowable Emissions (before installation of internal float roof and seals (distillate service))

Pollutant	Allowable Emissions		Potential Emissions	
	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)
PM	0	0	0	0
SO_2	0	0	0	0
VOC	**2.32**	**0.42**	**2.32**	**0.42**
CO	0	0	0	0
NOx	0	0	0	0
Single HAP	0.62	0.11	0.62	0.11
Combination of HAPs	1.41	0.26	1.41	0.26

HAPs are based on application - change in tank service from distillates to gasoline results in a reduction of HAP emissions.

Total Potential and Allowable Emissions (after installation of internal float roof and seals (gasoline service))

Pollutant	Allowable Emissions		Potential Emissions	
	(lb/day)	(ton/yr)	(lb/day)	(ton/yr)
PM	0	0	0	0
SO_2	0	0	0	0
VOC	**15.89**	**2.90**	**15.89**	**2.90**
CO	0	0	0	0
NOx	0	0	0	0
Single HAP	0.25	0.05	0.25	0.05
Combination of HAPs	0.68	0.12	0.68	0.12

HAPs are based on application - change in tank service from distillates to gasoline results in a reduction of HAP emissions.

The potential emissions increase due to the installation of the internal float roof and seals is:

VOC	**13.57 lb/day**	**2.48 ton/yr**

The resultant increase in emissions is less than ten (10) tons per year and less than fifteen (15) pounds per day. Therefore 326 IAC 2-7-10.5 (d)(10) and (d)(4)(B) for minor source modifications do not apply. However, the conversion of this tank will subject the tank to New Source Performance Standard (NSPS), 40 CFR 60, Subpart Kb, Standards of Performance for Volatile Organic Liquid Storage Vessels. Therefore, a minor source modification is required per 326 IAC 2-7-10.5 (d)(6).

For those modifications involving NSPS where the only applicable requirements are ongoing reporting or record keeping, a minor permit modification is required under 326 IAC 2-7-12 (b)(1)(E) because this type of NSPS change is not considered by the EPA to be a Title I modification.

County Attainment Status

Volatile organic compounds (VOC) and oxides of nitrogen are precursors for the formation of ozone. Therefore, VOC and NOx emissions are considered when evaluating the rule applicability relating to the ozone standards. Lake County has been designated as severe nonattainment for ozone. Therefore, VOC and NOx emissions were reviewed pursuant to the requirements for Emission Offset, 326 IAC 2-3.

Mobil Oil Corporation is a major stationary source for the purpose of 326 IAC 2-3 (Emission Offset) because they are located in Lake County (severe ozone nonattainment) and have the potential to emit greater than twenty-five (25) tons per year of volatile organic compounds.

The emissions increase from this modification is less than twenty-five (25) tons per year (de minimis) when aggregated on a pollutant specific basis with all other net emissions increases from the source over a five (5) consecutive calendar year period. See calculations (Appendix A) Contemporaneous Increases. Therefore, pursuant to 326 IAC 2-3-2 (b)(1) (Applicability) Emission Offset requirements do not apply.

Part 70 Permit Determination

326 IAC 2-7 (Part 70 Permit Program)

This existing source submitted their Part 70 (T-089-7786-00233) application on December 16, 1996. The permit was issued on December 30, 1997. The Title V Permit will be modified according to 326 IAC 2-7-12 (b)(1)(E), Minor permit modification.

This status is based on all the air approvals issued to the source. This status has been verified by the HDEM.

Federal Rule Applicability

Existing Volatile Organic Liquid Storage Vessel (Tank 115) will now be subject to the New Source Performance Standards (NSPS) in 326 IAC 12, (40 CFR 60.112b, Subpart (Kb).

a) This rule requires that volatile organic liquid storage vessels with a capacity equal to or greater than 151 cubic meters (39,000 gallons) containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa (0.75 psi) but less than 76.6 kPa (11 psi), shall be equipped with an internal floating roof with appropriate primary and/or secondary seals.

b) Mobil Oil Corporation is adding an internal floating roof with mechanical shoe seal and rim-mounted secondary seal to Tank 115 in order to service gasoline. They have acknowledged the requirements in their request for this modification. Tank 115 will be subject to the reporting and record keeping requirements of 40 CFR 60.115b and the monitoring requirements of 40 CFR 60.116b.

State Rule Applicability

326 IAC 2-6 (Emission Reporting)

This facility is subject to 326 IAC 2-6 (Emission Reporting), because the source emits more than 10 tons/yr of VOC in Lake County. Pursuant to this rule, the owner/operator of this facility must annually submit an emission statement of the facility. The annual statement must be received by April 15 of each year and must contain the minimum requirements as specified in 326 IAC 2-6-4.

Mobil Oil Corporation submits an annual emission statement that includes all volatile organic liquid storage tanks.

State Rule Applicability (continued)

326 IAC 8-4-3 (Petroleum Liquid Storage Facilities)

326 IAC 8-4-1 (c) exempts this vessel from the standards and requirements in 326 IAC 8-4-3 (b) and (d) because Mobil Oil Corporation and Tank #115 are not new sources. However, the standards and requirements of this rule are met by compliance with the New Source Performance Standards.

326 IAC 8-9 (Volatile Organic Liquid Storage Vessels)

326 IAC 8-9-2 (8) exempts this vessel from the standards and requirements in 326 IAC 8-9 because the vessel is subject to 40 CFR 60, Subpart Kb, New Source Performance Standards for Volatile Organic Liquid Storage.

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 188 hazardous air pollutants set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Management (OAM) Construction Permit Application Form Y.

Although there are air toxics associated with the storage of gasoline, there will be a decrease of air toxic emissions due to the conversion of this tank from distillate service to gasoline service. Mobil Oil Corporation submits this information with their annual emission statement.

326 IAC 2-4.1 (Major Sources of Hazardous Air Pollutants)

326 IAC 2-4.1-1 (New source toxics control) does not apply to the addition of this internal float pan to Tank 115 because this is not a construction or reconstruction of a major source of HAPs as defined in 40 CFR 63.41. Also, this addition to Tank 115 does not result in an increase of ten (10) tons per year of a single HAP or twenty-five (25) tons per year of a combination of HAPs. However, the addition of an internal float roof with a mechanical shoe seal and rim-mounted secondary seal would be generally accepted as the maximum achievable control technology, MACT, for hazardous air pollutant emissions from the storage of gasoline.

Conclusion

The conversion / modification of Tank #115 by the addition of an internal float roof including mechanical shoe seal and rim-mounted secondary seal will be subject to the conditions of the attached proposed **Minor Source Modification 089-12342-00233 and Minor Permit Modification 089-12382-00233.**

The minor permit revision will consist of replacing Tank 159 in Section D.3 of the current Part 70 Permit. Section D.3 was the construction and operation conditions for Tank 159 which Mobil does not plan to build (see attached facsimile). In Section D.3, the construction conditions section for Tank 159 will be removed and the existing operation conditions section, which contains the federal requirements for gasoline storage tanks, will become the facility operation conditions section for the converted Tank 115.

Proposed Changes:

The following changes were agreed to and made as the first minor permit modification for this source (~~strikeout~~ added to show what was deleted and **bold** added to show what was added):

1. In the Table of Contents (page 4 of 44), Section D.3 changes as follows to add the modified Tank 115 and Section D.4 changes to delete Tank 115:

D.3 FACILITY CONDITIONS - Storage Tank No~~. 159~~ **115** **35**

~~D.3.1 **General Construction Conditions** 35~~
~~D.3.2 **Effective Date of the Permit** 35~~
~~D.3.3 **First Time Operation Permit** 35~~

~~D.3.4 **Emission Limitations and Standards [326 IAC 2-7-5(1)]** 36~~

Emission Limitations and Standards [326 IAC 2-7-5(1)]
D.3.1 Volatile Organic Compounds (VOC) 35
D.3.2 Preventive Maintenance Plan [326 IAC 2-7-5(13)] 35

Compliance Determination Requirements
~~D.3.5~~ **D.3.3** Testing Requirements [326 IAC 2-7-6(1)] ~~36~~ **35**
D.3.4 Monitoring – Testing and Procedures Equipment (Visual Inspection, Repair, & Notification) 35

~~**Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]**~~
~~D.3.6 Monitoring - Testing and Procedures Equipment (Visual Inspection, Repair, & Notification) 36~~

D.3.5 Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)] 36

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]
~~D.3.7~~ **D.3.6** Record Keeping and Reporting Requirements (Tank Inspections) 36
~~D.3.8~~ **D.3.7** Record Keeping and Reporting Requirements (Product Storage) 37
~~D.3.9~~ **D.3.8** Reporting Requirements 37

D.4 FACILITY OPERATION CONDITIONS ~~– Four (4)~~ **Three (3)** fixed cone Storage Tanks No. ~~115,~~ 152, 153, & 37

---

2. In Section A, Source Summary, (page 6 of 44), Section A.2 (3) has been changed as follows to replace Tank 159 with the modified Tank 115:

(3) One (1) petroleum liquid storage tank identified as Storage Tank No. ~~159~~ **115** with the following specifications:

(a) Storage Tank No. ~~159~~ **115** is used to store petroleum products ~~with a maximum true vapor pressure of 9.4 psia at 68°F~~ **(gasoline or distillates**). The tank has an internal floating roof equipped with a ~~Liquid Mounted Primary~~ **mechanical shoe seal** and Rim Mounted Secondary seal. The maximum design capacity of the tank is ~~2,520,000~~ **1,617,924** gallons.

---

3. In Section A, Source Summary, (page 6 of 44), Section A.3 (7) has been changed as follows to remove Tank 115 and re-numerate the remaining tank descriptions.

a) ~~Storage Tank No. 115 is used to store No. 1 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 1,890,000 gallons.~~

~~b)~~ **a)** Storage Tank No. 152 is used to store No. 2 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.

~~c)~~ **b)** Storage Tank No. 153 is used to store Diesel RM Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.

~~d)~~ **c)** Storage Tank No. 37 is used to store Waste Water with a maximum true vapor pressure of less than 0.75 psia at 60°F. This tank has a fixed cone roof and a maximum design capacity 95,340 gallons.

---

4. In Section A, Source Summary, (page 7 of 44), the remaining items in Section A.3 (7) are re-numerated as follows:

~~e)~~ d) Storage Tank Nos. 157 and 158 are used to store Distillates with a maximum true vapor pressure of less than 0.1 psia at 68°F. These tanks each have a fixed-cone roof and a maximum design capacity of 2,520,000 gallons.

~~f)~~ e) Eight (8) Storage Vessels:

~~g)~~ f) Six (6) Underground Storage Tanks:

---

5. In Section D.3, Facility Conditions, the facility conditions description box has been changed as follows to replace Tank 159 with the modified Tank 115:

(3) One (1) petroleum liquid storage tank identified as Storage Tank No. ~~159~~ **115** with the following specifications:

(a) Storage Tank No. ~~159~~ **115** is used to store petroleum products ~~with a maximum true vapor pressure of 9.4 psia at 68°F~~ **(gasoline or distillates**). The tank is equipped with an internal floating roof ~~equipped with a Liquid Mounted Primary~~ **which has a mechanical shoe seal** and Rim Mounted Secondary seal. The maximum design capacity of the tank is ~~2,520,000~~ **1,617,924** gallons.

---

6. In Section D.3, Facility Conditions, the following Construction Conditions for Tank 159 have been removed because Mobil Corporation's Hammond Terminal has indefinitely postponed their plans to build Tank 159 and the allotted construction period has expired.

~~THIS SECTION OF THE PERMIT IS BEING ISSUED UNDER THE PROVISIONS OF 326 IAC 2-1 AND 40 CFR 52.780, WITH CONDITIONS LISTED BELOW.~~

~~**Construction Conditions [326 IAC 2-1-3.2]**~~

~~**General Construction Conditions**~~

~~D.3.1 This permit to construct does not relieve the Permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.~~

~~**Effective Date of the Permit**~~

~~D.3.2 Pursuant to IC 13-15-5-3, this section of this permit becomes effective upon its issuance.~~

~~**First Time Operation Permit**~~

~~D.3.3 This document shall also become the first time operation permit for the facilities under this section of this permit, pursuant to 326 IAC 2-1-4 (Operating Permits) when, prior to start of operation, the following requirements are met::~~

~~(a) The attached affidavit of construction shall be submitted to:~~

~~Indiana Department of Environmental Management
Permit Administration & Development Section, Office of Air Management
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015~~

~~and to:~~

~~Hammond Department of Environmental Management
Air Pollution Control Division
5925 Calumet Avenue Room 304
Hammond, Indiana 46320~~

~~verifying that the facilities were constructed as proposed in the application. The facilities covered in this section of this permit may begin operating on the date the Affidavit of Construction is postmarked or hand delivered to HDEM.~~

~~(b) If construction is completed in phases; i.e., the entire construction is not done continuously, a separate affidavit must be submitted for each phase of construction. Any permit conditions associated with operation start up dates such as stack testing for New Source Performance Standards (NSPS) shall be applicable to each individual phase.~~

~~(c) The permittee shall receive an Operation Permit Validation Letter from the Hammond Department of Environmental Management and attach it to this permit.~~

---

7. In Section D.3, Facility Conditions, the remaining existing operation conditions for Tank 159 are unchanged and moved forward in the document to become the operation conditions for Tank 115. Pages 35, 36, and 37 are affected by the above removal of the construction conditions for Tank 159 and re-positioning of the operation conditions for Tank 115.

---

8. In Section D.4, Facility Operation Conditions – Insignificant Activities, Tank 115 is removed from the facility description box as follows:

(7) ~~Four (4)~~ **Three (3)** fixed cone Storage Tank Nos. ~~115,~~ 152, 153 and 37 with the following specifications:

~~a) Storage Tank No. 115 is used to store No. 1 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 1,890,000 gallons.~~

~~b~~) **a)** Storage Tank No. 152 is used to store No. 2 Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.

~~c~~) **b)** Storage Tank No. 153 is used to store Diesel RM Fuel Oil with a maximum true vapor pressure of less than 0.1 psia at 68°F. This tank has a fixed cone roof and a maximum design capacity of 5,040,000 gallons.

~~d~~) **c)** Storage Tank No. 37 is used to store Waste Water with a true vapor pressure of less than 0.75 psia at 60°F. This tank has a fixed cone roof and a maximum design capacity 95,340 gallons.

The conversion / modification of Tank #115 by the addition of an internal float roof including mechanical shoe seal and rim-mounted secondary seal will be subject to the conditions of the attached proposed **Minor Source Modification 089-12342-00233 and Minor Permit Modification 089-12382-00233.**

Mobil Oil Corporation - Hammond Terminal

*** Contemporaneous Increases per 326 IAC 2-3-1 (t)**

APP DATE	APPLICATION DESCRIPTION	ENGR	PM TPY	PM10 TPY	VOC TPY	NOx TPY	SO2 TPY	CO TPY	Pb TPY	Air Toxic TPY
5/31/95	OP mod Tank 116				-0.471					
9/12/95	ID consolidation Racks + Tanks									
8/14/98	155 - seal change	R Holder		no emissions increase						
4/7/00	156 - replacement upgrade of worn seals	R Holder		no emissions increase						
4/24/00	115 - add internal roof and seals	R Holder			2.477					
Totals:			0	0	2.01	0	0	0	0	0

* "Net Emissions Increase" definition in 326 IAC 2-3-1 (t)

to determine applicability to Emission Offset Rule 326 IAC 2-3.

Hammond Department of Environmental Management
Emission Inventory System Update (EIS)
Storage of Organic Liquids ... AP-42 ... Section 7

Tank 115 - Current Service - Vertical Fixed Roof Tank with Fuel Oil #2

General Information:

Company Name	**Mobil Oil Corp Hammond**	
Year of Data	**review**	
Plant ID #	089-0233	

Tank Information:

Tank ID #	**115**	
Tank Shell Diameter	90	feet
Tank Shell Height	40	feet
Tank Capacity (max liquid)	1,617,924	gallons

Product Information:

Product Stored	Distillate Fuel Oil #2	
*Vapor Molecular Weight	130.0	lb/lb-mole
*True Vapor Pressure @ 60° F	0.0074	psia - @ 60° F
*True Vapor Pressure @ 40° F	0.0031	psia - @ 40° F
Annual Product Throughput	24,268,860	gallons/yr
Average Annual Liquid Height	20	feet

(If unknown, use half of tank shell height.)

*This product information available in the AP-42, Section 7.
*if tank is not white, or if it contains crude oils - see calculations

Ls = Standing Storage Losses =	0.1452	Tons/yr
Lw = Working Losses =	0.2779	Tons/yr
Lt = Ls + Lw = Total Losses =	**0.4231**	**Tons/yr**

See AP-42, Section 7, for clarification of the following calculations:

Ls = Standing Storage Losses = 365*(Vv)*(Wv)*(Ke)*(Ks)

Hr = tank roof height = Sr*Rs = 0.0625*(D/2) =	2.813	feet
Hro = roof outage = Hr/3 =	0.938	feet
Hl = liquid height (1/2 tank height if unknown) =	20.000	feet
Hs = tank shell height =	40.000	feet
Hvo = vapor space outage = Hs - Hl + Hro =	20.938	feet
D = tank diameter =	90.000	feet
Vv =Tank Vapor Space Volume = (π/4)*(D^2)*(Hvo) =	133198.620	cft
Mv = vapor molecular weight (Tables 7.1-2 & 3)	130.0	lb/lb-mole
Pva = vapor pressure at TLa (Tables 7.1-2 & 3)	0.0074	psia @ 50-60°F
TLa = daily average liquid surface temperature°R	510.843	°R
as calculated for Chicago area using AP-42, Section 7		
Wv = Vapor Density = (Mv*Pva)/(10.731*TLa) =	0.0001755	lb/cft
ΔTa = daily ambient temp range (Chgo area) =	19.00	°R
∂ = tank paint solar absorptance (Table 7.1-7)=	0.17	dimensionless
***(this factor (∂) will change for non-white tanks)**		
I = daily total solar insolation factor (Chgo) =	1215	Btu/sqft•day
ΔTv = daily vapor temp range =		
= 0.72*(ΔTa) + 0.028*(∂)*(I) =	19.4634	°R
TLa = daily average liquid surface temp °R	510.843	°R
ΔPv = daily vpr pres range = Pv@60-Pv@40 =	0.0043	psia
ΔPb = breather vent pressure setting range =	0.06	psig
Pa = atmospheric pressure =	14.7	psia
Pva = vapor pressure at TLa (Tables 7.1-2 & 3)	0.0074	psia
Ke = Vapor Space Expansion Factor = (ΔTv/TLa) + (ΔPv-ΔPb)/(Pa-Pva) =	0.034310	dimensionless
Ks = Vented Vapor Saturation Factor = 1/(1+ 0.053*Pva*Hvo) =	0.991855	dimensionless

Ls = Standing Storage Losses, lb/yr

Ls = 365*(Vv)*(Wv)*(Ke)*(Ks)

Ls = 290.337 lb/yr

See AP-42, Section 7, for clarification of the following calculations:

Lw = Working Losses = 0.0010*(Mv)*(Pva)*(Q)*(Kn)*(Kp)

Q = annual net thruput, bbl/yr - (42 gal/bbl) =	577,830.0	bbl/yr
VLx = tank max liquid volume - (7.481 gal/cft)	216,271.1	cft
N = # of turnovers per year = 5.614*Q/VLx =	15.0	dimensionless
Kn = turnover factor, =1 unless N>36	1.0000	dimensionless
Kp = working loss product factor =	1.00	dimensionless

*** Kp = 0.75 for crude oils,**
1.0 for all other products

Lw = Working Losses, lb/yr

Lw = 0.0010*(Mv)*(Pva)*(Q)*(Kn)*(Kp)

Lw = 555.872 lb/yr

The End

Hammond Department of Environmental Management
Emission Inventory System Update (EIS)
Storage of Organic Liquids ... AP-42 ... Section 7

Tank 115 - Proposed Service - Internal Float Roof Tank with Gasoline

General Information:

Company Name	**Mobil Oil Corp Hammond**	
Year of Data	**review**	
Plant ID #	089-0233	

Tank Information:

Tank ID #	**115**	
Tank Shell Diameter	90	feet
Tank Shell Height	40	feet
*Tank Shell Type (Welded or Riveted)	Welded	
*Tank Deck Type (Welded or Bolted)	Welded	
*Tank Rim Seal Type	Mechanical Shoe w Rim-mtd Secondary	
Tank Capacity (max liquid)	1,617,924	gallons

Product Information: **

Product Stored	gas	
Vapor Molecular Weight	62.00	lb/lb-mole
True Vapor Pressure @ 60° F.	5.816	psia - @ 60° F
Average Organic Liquid Density	5.60	lb/gal
Annual Product Throughput	50,000,000	gallons/yr

*if this information changes, see calculations
if tank contains crude oil, see calculations
**This product information available in the AP-42, Section 7.

Lr =	Rim Seal Loss =	0.210	Tons/yr
Lwd =	Withdrawal Loss =	0.056	Tons/yr
Lf =	Deck Fitting Losses =	2.634	Tons/yr
Ld =	Deck Seam Loss =	0.000	Tons/yr
Lt = Lr + Lwd + Lf = Total Loss =		**2.900**	**Tons/yr**

RH/06/01/00

See AP-42, Section 7, for clarification of the following calculations:

* asterisked items change with rim seal information (see AP-42, Section 7)

Rim Seal Loss:

*	Kr = seal factor (this seal factor from TANKS 4.0) =	0.6	lb-mole/ft•yr
	P* = vapor pres. function - Equation (3-3) =	0.125243	dimensionless
	D = tank diameter =	90	feet
	Mv = vapor molecular weight (Table 7.1-3)	62.00	lb/lb-mole
crude?	Kc = product factor, Kc = 0.4 for crude oils, Kc = 1 for all other organic liquids	1.0	

Lr = Rim Seal Loss = (Kr)*(P*)*(D)*(Mv)*(Kc) = 419.315 lb/yr

Withdrawal Loss:

	Q = annual throughput, (42 gal/bbl) =	1190476	bbl/yr
	WL = ave. organic liquid density (Table 7.1-3) =	5.6	lb/gal
	D = tank diameter =	90	feet
	Nc = number of columns =	6	
	C = shell clingage factor, (see Table 7.1-10) = C = 0.006 for crude oil	0.0015	bbl/1000 sqft

Lwd =

Withdrawal Loss = (0.943*Q*C*WL/D)(1+Nc/D) = 111.763 lb/yr

Deck Fitting Loss:

	Ff = total deck fitting loss factor (Table 7.1-16) = (go to cell G47)	678.5	lb-mole/yr
	P*,Mv, and Kc as defined in above calculations		

Lf = Deck Fitting Losses = (Ff)*(P*)*(Mv)*(Kc) = 5268.616 lb/yr

Deck Seam Loss:

	Kd = deck seam loss per unit seam length factor=	0.00	lb/mole/ft-yr
	(0.0 for welded deck, 0.34 for bolted deck)		
	Sd = deck seam length factor =	0.2	ft/sqft
	D,P*,Mv, and Kc are as defined above		

Ld =

Deck Seam Loss = (Kd)*(Sd)*(D^2)*(P*)*(Mv)*(Kc)= 0.000 lb/yr

Tanks with welded decks do not have deck seam losses

The End

Kr
VMP = 6.7
LMP = 3.0
VMP w/sec = 2.5
LMP w/sec = 1.6
MechShoe = 0.6 (Tanks 4.0)

Summary of Internal Float Roof Tank Deck Fitting Loss Factors
for typical numbers based on tank diameter, see AP-42, Table 7.1-16
if tank-specific data is unavailable use Figures 7.1-24 and 25

Deck Fitting Type	Quantity	Factor	Total
Access Hatch:			
Bolted Cover, Gasketed	0	1.6	0
Unbolted Cover, Gasketed	0	11	0
Unbolted Cover, Ungasketed	1	25	25
Automatic Gauge Float Well:			
Bolted Cover, Gasketed	0	5.1	0
Unbolted Cover, Gasketed	0	15	0
Unbolted Cover, Ungasketed	1	28	28
Column Well:			
Builtup Column - Sliding cover, Gasketed	0	33	0
Builtup Column - Sliding Cover, Ungasketed	6	47	282
Pipe Column - Flexible Fabric Sleeve Seal	0	10	0
Pipe Column - Sliding Cover, Gasketed	0	19	0
Pipe Column - Sliding Cover, Ungasketed	0	32	0
Ladder Well:			
Sliding Cover, Gasketed	0	56	0
Sliding Cover, Ungasketed	1	76	76
Roof Leg or Hanger Well:			
Adjustable	28	7.9	221.2
Fixed	0	0	0
Sample Pipe or Well:			
Slotted Pipe - Sliding Cover, Gasketed	0	44	0
Slotted Pipe - Sliding Cover, Ungasketed	0	57	0
Sample Well - Slit Fabric Seal, (10% open area)	1	12	12
Stub Drain, 1" diameter	28	1.2	33.6
Vacuum Breaker:			
Weighted Mechanical Actuation, Gasketed	1	0.7	0.7
Weighted Mechanical Actuation, Ungasketed	0	0.9	0
Total Deck Fitting Loss Factor (Ff) =			**678.5**